



OCTOBER 2015

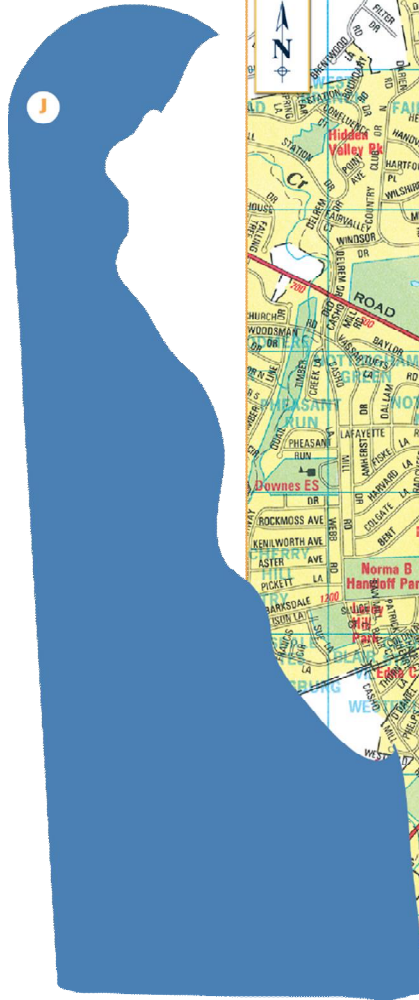
# TASK I HAZARD ELIMINATION PROGRAM



**Whitman, Requardt & Associates, LLP**  
Engineers · Architects · Environmental Planners Est. 1915

# SITE J

N311 (N. College Avenue) MP 0.0 – 0.39



From W. Main St  
to 0.06 mile  
south of White  
Clay Drive

AADT – 4,300  
Length – 0.40 mi  
Speed – 25 mph



## SITE J North College Avenue

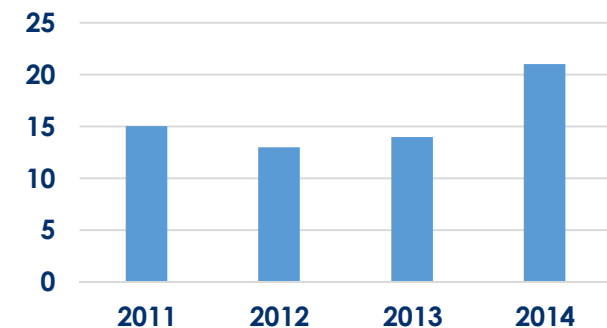
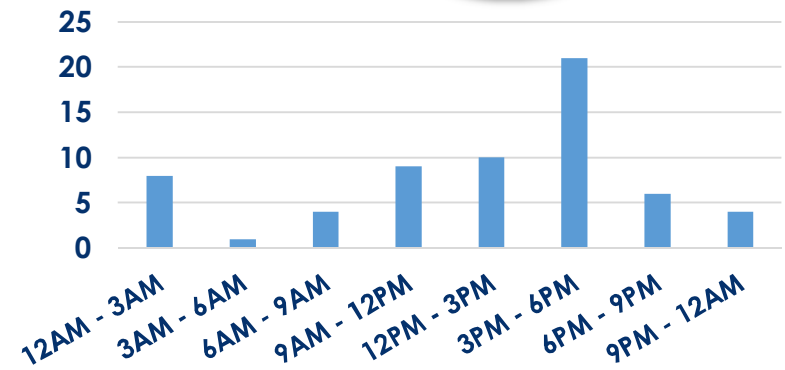
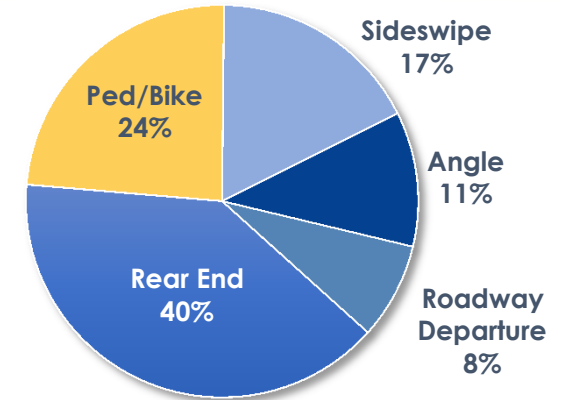
### ■ Relevant Projects

- 2005 HEP Site K (Cleveland Ave at N. College Ave)
- N. College Ave at Cleveland Ave signal rebuilt to provide APS, lead pedestrian interval and mast arms (2013)
  - Recent request by City of Newark to investigate providing an exclusive pedestrian phase (scramble)
- HRGX improvements at CSX rail crossing
  - Ongoing coordination with CSX regarding 4-quadrant gate proposal and DelDOT “queue-cutter” warning device

## SITE J North College Avenue

### ■ Crash Summary (Jan 2011 – Dec 2014) – 63 crashes

- N. College Ave at W. Cleveland Ave – 14 crashes
  - 5 EB rear end crashes
  - 2 pedestrian crashes
- N. College Avenue at Main St – 14 crashes
  - 5 WB rear end crashes
  - 3 pedestrian crashes
- S. College at Main St – 13 crashes
  - 4 WB rear end crashes
  - 4 NB left-turn sideswipe/rear end crashes
- 9 bicyclist crashes
  - 7 involved turning vehicles at driveways/side streets



## SITE J North College Avenue

### ■ Field Observations

- Bike lanes are approximately 3 - 4 feet
- N. College Ave at Cleveland Ave
  - Protected/permissive left-turn phasing on the WB approach; permissive left turns on the EB, NB, and SB approaches
  - NB and SB left and right-turning vehicles frequently must yield to pedestrians
  - NB and WB queues do not clear during the PM peak
- N. College Ave/S. College Ave at Main St
  - Split phasing on NB S. College Ave and SB N. College Ave; exclusive pedestrian phase (scramble)
  - NB left-turning motorists in the left lane occasionally travel into the rightmost receiving lane on WB Main St
  - WB through queues from the downstream signal at Main St at New London Rd occasionally extend to N. College Ave

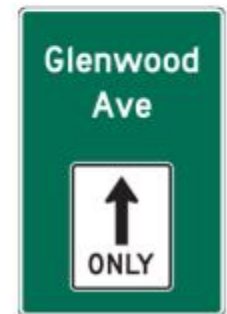
## SITE J North College Avenue

### ■ Recommendations

- Convert turning tracks to a solid line for NB left-turn lanes on NB S. College Ave at Main St
- Coordinate with City of Newark/UD regarding:
  - Overhead decorative sign structure with D15-1 lane usage/destination signs on NB S. College Ave approaching Main St
  - Exclusive pedestrian phase (scramble) at N. College Ave at Cleveland Ave
  - Options for additional delineation of the bike lanes (e.g., signing, pavement markings, green pavement)
  - Assess split phasing along NB/SB N. College Ave
  - Assess benefits of NB N. College Ave right-turn lane



OR



D15-1

## SITE J

### North College Avenue – PM peak analysis

- Pedestrian scramble
  - Decreases intersection delay from 90 sec to 80 sec (remains LOS F)
  - No significant change in delay with right turns on red prohibited
- NB/SB split (sequential) phasing
  - Increases intersection delay to 150 sec
  - Adding pedestrian scramble further increases delay to 215 sec
- Constructing NB right-turn lane
  - Decreases intersection delay by 15 sec (LOS E)
- SB left-turn phase (lagging when “tripped”); requires NB no right turn on red
  - 13 SB lefts during AM peak
  - Decreases SB delay from 50 sec to 35 sec (AM)
  - Intersection delay increases from 75 sec to 170 sec (AM)
  - 18 SB lefts during PM peak
  - Decreases SB delay from 85 sec to 40 sec (PM)
  - Intersection delay increases from 90 sec to 130 sec (PM)



# SITE P

N309 (Cleveland Avenue) - MP 0.2 - 1.3



From 0.07 mile east of Rose Street to SR 2/SR 72

AADT – 28,800  
Length – 1.11 mi  
Speed – 25/35 mph



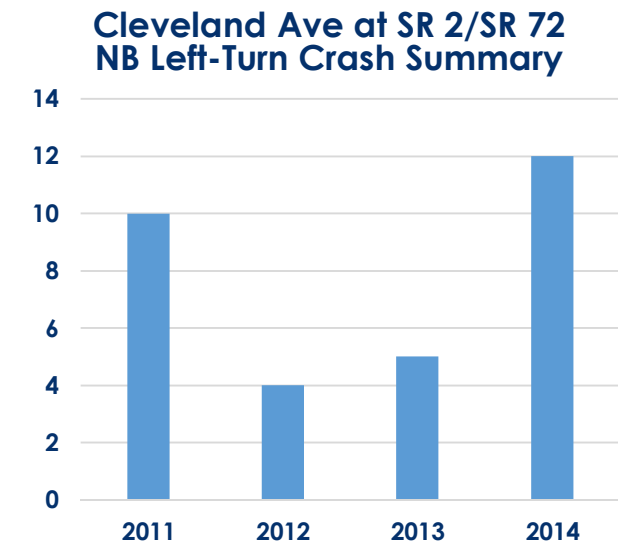
## SITE P Cleveland Avenue

### ■ Relevant Projects

- 2005 HEP Site K - Road diet along Cleveland Ave was considered
- 2012 HEP Site L/Z
  - Converting Margaret St to one way was considered
    - » Creek View Rd and Dean Dr/Christopher Ln are privately owned
    - » U-turns were not accommodated at Old Paper Mill Rd
  - Improvements at Cleveland Ave at SR 2/SR 72 (May 2015)
    - » NB and EB lane configuration changes
    - » Converted to split phasing and installed an EB right-turn overlap phase
- Constructed loon on Paper Mill Rd at Old Paper Mill Rd (2014)
- Lead/lag left-turn phasing was removed and cabinet was replaced at North Chapel St/Paper Mill Rd (2013)
- Area legislators have requested the City and DelDOT to investigate improvements at the N. Chapel St bridge
- Cleveland Ave included as part of a future P&R project
  - Includes pedestrian improvements at Wilbur St

## SITE P Cleveland Avenue

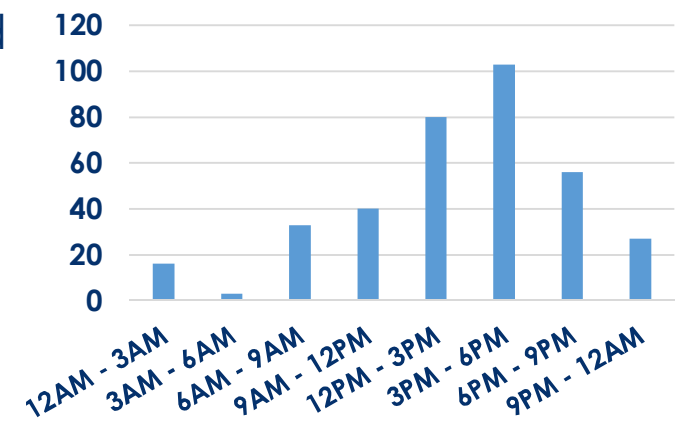
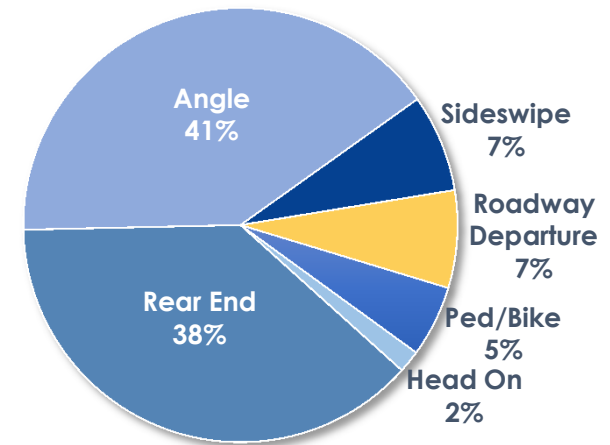
- Crash Summary (Jan 2011 – Dec 2014) – 358 crashes
  - Cleveland Ave at SR 2/SR 72 – 89 crashes
    - 32 NB left-turn crashes
    - 17 EB rear end crashes
  - Cleveland Ave at North Chapel St/ Paper Mill Ave – 55 crashes
    - 9 EB rear end crashes
    - 6 WB rear end crashes
    - 5 EB left-turn crashes
  - Cleveland Avenue at Wilbur St – 21 crashes
    - 13 EB rear end crashes
      - » 5 involved left turns
      - » 2 involved vehicles stopping for pedestrians
    - 2 pedestrian crashes within the marked crosswalk



**SITE P** Cleveland Avenue

## ■ Crash Summary - continued

- Midblock along Cleveland Ave from N. Chapel St/Paper Mill Rd to SR 2/SR 72
  - 29 EB and WB left-turn crashes
  - 11 EB and WB rear end crashes involved left-turning vehicles
- 10 pedestrian crashes
  - 3 crashes at N. Chapel St/Paper Mill Rd
  - 2 crashes at N. College Ave
  - 2 crashes at Wilbur St
  - 2 crashes between N. College Ave and Wilbur St
  - 1 near Winner Blvd
- 3 bicyclist crashes





## SITE P Cleveland Avenue

### ■ Field Observations

- Two lanes west of North Chapel St/Paper Mill Rd; four lanes east of North Chapel St/Paper Mill Rd (with no left-turn lanes)
- Cleveland Ave at SR 2/SR 72
  - Queues do not clear on the NB, SB and EB approaches during the PM peak (conditions are being monitored)
- Cleveland Ave at North Chapel St/Paper Mill Rd and Margaret St
  - Protected/permissive left-turn phasing on the NB/SB and EB/WB approaches; exclusive SW Margaret St phase
  - During the PM peak, queues did not clear on multiple approaches; frequent red light running observed

## SITE P

### Cleveland Avenue

#### ■ Additional Studies

- Monitor crashes at Cleveland Ave at SR 2/SR 72 following the 2015 intersection improvements
  - Implement Woodlawn Ave double left
  - Assess “Florida-T” intersection
- Continue coordination with City and P&R regarding RRFB and median refuge at Wilbur St
  - Assess signal or “HAWK” at McKees Ln
- Consider converting Margaret St to one-way NB
  - Assess diagonal ped/bike “scramble” phase
  - Assess protected intersection
  - Assess roundabout
- Consider a road diet along Cleveland Ave

- Ongoing/follow-up efforts
  - Conduct vehicular and pedestrian traffic counts once UD fall session commences to evaluate traffic signal vs. crosswalk enhancements
  - Identify ADA, right-of-way, and utility constraints for enhanced crosswalk design (e.g., RRFB)
  - Assess feasibility of pedestrian refuge median island along E Cleveland Ave and resulting parking and ingress/egress impacts
  - Further consider the feasibility of restricting parking east of N College Ave (CoN)



## SITE P

N Chapel St/Paper Mill Rd/Margaret St – PM peak analysis

- Convert Margaret St to one-way “NB”
  - Decreases intersection delay by 20 sec (LOS E)
  - May require evaluation of signaling Paper Mill Rd at Creek View Rd
- Pedestrian scramble
  - Increases intersection delay from 85 sec to 245 sec
  - With one-way Margaret St, still increases intersection delay by 70 sec
- Bicycle scramble
  - Increases intersection delay by 40 sec
  - With one-way Margaret St, still increases intersection delay by 15 sec

## SITE P

N Chapel St/Paper Mill Rd/Margaret St – PM peak analysis

### ■ Single-lane roundabout

- PM peak-hour volumes for each approach are 50% to 80% over capacity
- Average control delay per vehicle is 420 sec
- Likely over capacity beginning at 6:30 AM with congestion “spilling over” until 9:30 PM [good news; WFPS closes at 10...]

## SITE P

### McKees Lane signalization – PM peak analysis

- Vehicular and pedestrian volumes highly unlikely to satisfy signal warrant criteria
- Anticipated LOS A
- Available queue storage between McKees Ln and Capitol Trail: 500 ft
  - E Cleveland Ave at Capitol Trail 95<sup>th</sup>-percentile EB queue length: 835 ft
  - E Cleveland Ave at McKees Ln 95<sup>th</sup>-percentile WB queue length: 575 ft



## **SITE P** SR 2/SR 72/Woodlawn Ave – PM peak analysis

- “Florida-T” intersection (no Woodlawn Ave phase)
  - Intersection delay reduced by over 100 sec
  - Improves from LOS F to LOS C
  
- EB E Cleveland Ave – no right turn on red
  - Increases EB queue by 75 ft
  - Increases EB right-turn delay from 30 sec to 35 sec
  
- SB Capitol Trail – no right turn on red
  - Increases SB queue by 90 ft
  - Increases SB right-turn delay from 5 sec to 20 sec

## SITE P Cleveland Avenue

- Road diet
  - Travel times
    - No significant changes to EB/WB travel times between N Chapel St/Paper Mill Rd and Capitol Trail
  - Queues
    - WB thru at Winner Blvd 95<sup>th</sup>-percentile queue length increases from 160 ft to 575 ft
  - LOS/delay
    - No significant changes to LOS or delay at Paper Mill Rd, Winner Blvd, or Capitol Trail

## SITE P

### Cleveland Avenue

- Road diet – DelDOT's recent “lessons learned” from Philadelphia Pike in Claymont
  - Crash rates and total crashes decreased yet corridor-wide traffic volumes increased
  - Vehicular speeds more uniform and more consistent with posted speed limit
  - Slight degradation in LOS at signalized intersections